PTO: 2002-4162

Japanese Published Unexamined Utility Patent Application (U) No. 06-009355, published February 4, 1994; Application Filing No. 04-53158, filed July 7, 1992; Inventor(s): Hiroshi Sakashita et al.; Assignee: Sankyo Precision Instruments, Inc.; Japanese Title: Motors

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MOTORS

CLAIM(S)

1) A motor, wherein a metal bearing rotatably supporting a shaft is held by an insulating holder and said shaft is secured to a rotor, characterized in that a yoke sheet is projected from the inner circumferential surface of said insulating holder and brought into contact with the bottom surface of said metal bearing.

DETAILED DESCRIPTION OF THE INVENTION

(0001)

(Field of Industrial Application)

The present invention pertains to a motor used for a rotating/driving source of various electronic equipment.

(0002)

(Prior Art)

For example, the structure shown in Fig. 7 is known as a structure of a motor with a brush for use in VTRs. and tape recorders. In the figure, 1 indicates a shaft

rotatably supported by a pair of metal bearings 2 and 3, which are supported by insulating holder 4. The insulating holder 4 is made of resin integrally formed into yoke sheet 5, and 6 indicates a rotor consisting of coil 7 and core 8 secured to the shaft.

(0003)

Fig. 8 and Fig. 9 each respectively show a planar view and a sectional view of bearing holder assembly 10 used for the motor of Fig. 7. This bearing holder assembly 10 is structured by integrally forming the insulating holder 4 in yoke sheet 5. The motor is assembled by securing a pair of bearings 2 and 3 to the through-hole 4A in the insulating holder 4 and subsequently by inserting shaft 1 into the bearings 2 and 3. The following passage explains the method to secure a pair of bearings 2 and 3 with reference to Fig. 10 and Fig. 12.

(0004)

As shown in Fig. 10, guide bar 16, die 17, and punch 18 are prepared. Bearing holder assembly 10 and a pair of bearings 2 and 3 are positioned on the top and bottom surfaces of the bearing holder assembly 10. Then, guide bar 16 is inserted into the bearing 3, bearing holder assembly 10, and into the bearing 2 in this order. Subsequently, as shown in Fig. 11, by descending punch 18 and inserting the bearing 2, the bearings 2 and 3 are almost simultaneously pushed into the through hole 4A inside the insulating holder 4. Then, as shown in Fig. 12, the guide

bar 16 is pulled out downward and return the punch 18 upward; by so doing, bearing assembly 14 in which a pair of bearings 2 and 3 are secured to the bearing holder assembly 10 is manufactured.

(0005)

The outer diameters of the bearings 2 and 3 and the inner diameter of the insulating holder 4 are secured by pressing, so they are firmly engaged in each other. The outer diameter of the guide bar 16 is slightly smaller than the inner diameters of the bearings 2 and 3.

(0006)

According to this insertion-securing method, by use of one guide bar 16, a pair of bearings 2 and 3 are simultaneously pushed into the through-hole 4A in the insulating holder 4, so the assembly device can be assembled easily and quickly. Also, there is an advantage that the inner diameters of a pair of bearings 2 and 3 have excellent coaxial accuracy.

(0007)

(Problems of the Prior Art to Be Addressed)

With the prior art motor, however, despite that it can be assembled by a simple method, it comes with the following problems.

(1) When a resin material or a metal sinter is used for the bearings 2 and 3 and there is a large seam for the bearings and the insulating holder 4, a slight

shrinking occurs to the inner diameter of the bearings 2 and 3, so the bearings 2 and 3 cramp the guide bar 16. Therefore, when the guide bar is pulled out, the position of the bearing 2 on the upper side is displaced, as shown in Fig. 13. As a result, not only the motor is disfigured, its noise increases at a time of rotation and its useful life is shortened.

(0008)

(2) Since the clearance for the outer diameter of the guide bar 16 relative to the inner diameter of the bearing 2 is preset, the inner circumference 2A of the bearing 2 is inclined toward the motor mounting surface 5A. So, the perpendicular degree of the shaft 1 to the motor mounting surface 5A is lost. Or, even if the perpendicular degree is right, the resin constituting the insulating holder 4 has a creep phenomenon due to environmental conditions, such as side pressure exerted on the shaft 1 at a time of rotation, by which the inner circumferential surface 2A of the bearing 2 is inclined, leading to the lesser perpendicular degree.

(0009)

(3) The shaft 1 and the yoke 5 are electrically connected via the insulating holder 4; for example, a pulley is mounted on the shaft 1 and a rubber belt is mounted on the pulley, so static electricity generated by friction of the rubber belt at a time of rotation electrifies the pulley, which leads to the generation of noise. Or electromagnetic wave noise generated in the motor is discharged outside the motor

if a radial ball bearing is used for the bearings 2 and 3 and the diameter of the radial ball bearing inner ring is defined as D3, the diameter of the through-hole 5B has the relationship, D > D3. By supplying a synthetic resin to this yoke sheet 5 from guide hole 5C, the insulating holder 4 integrated with the yoke sheet 5 is formed, as shown in Fig. 4 and Fig. 5. By this, the yoke sheet 5 projects from the inner circumferential surface of the through-hole 4A of the insulating holder 4; 5D indicates the end face of the projected section of yoke sheet 5, and this end face becomes a securing surface when the bearing 2 is pushed in later.

(0016)

Subsequently, by applying the method shown in Fig. 10 and Fig. 12 to the bearing holder assembly 10 thus structured, a pair of bearings 2 and 3 are pushed in and secured to the through-hole 4A in the insulating holder 4 to form the bearing assembly 14 shown in Fig. 6. As is evident from Fig. 6, the bearing 2 is secured by its bottom surface 2B being contacted with the end face 5D of the yoke sheet 5. In other words, the end face 5D of the yoke end face 5 functions as a stopper for the bearing 2.

(0017)

The motor of as the embodiment example of the present invention has the following advantage.

1) The position displacement of the bearing 2 shown in Fig. 6 can be

prevented because the end face 5D of yoke sheet 5 functions as a stopper even if the bearings 2 and 3 cramp the guide bar 16 when the bearings 2 and 3 are made of metal sinter or resin material. As a result, the appearance of the motor will not be undercut, and the noise at a time of rotation is reduced, providing a long useful life.

(0018)

(2) Since the bearing 2 is contacted with and secured to the end face 5D of the yoke sheet 5, the parallel level of the motor-mounting surface 5A of the yoke sheet 5 and the end face 5D can be easily processed with high precision. Also, the inner circumferential surface 2A and bottom surface 2B of the bearing 2 can be processed with very high precision. Therefore, the inner circumferential surface 2A of the bearing 2 needs not be inclined toward the motor mounting surface 5A in securing, and the creep phenomenon of a synthetic resin on shaft 1 at a time of rotation caused by side pressure and environmental conditions can be reduced, so the perpendicular degree of the shaft 1 can be improved.

(0019)

(3) The shaft 1 and the yoke sheet 5 are electrically connected via the bearing 2, so by grounding the yoke sheet 5 to the chassis, static electricity generated by friction of the rubber belt at a time of rotation is eliminated through the route of shaft 1 → bearing 2 → yoke sheet 5 → chassis. Without static charge, the noise will not be generated. The electromagnetic noise generated in the motor is eliminated

through the same route, so it will not be discharged outside the motor.

(0020)

In the aforementioned embodiment example, 3 guide holes 5C are made in the cavity of the yoke sheet 5, but any proper number of guide holes can be made as long as more than one guide hole are made. Also, notches may be made in the through-hole 5B in stead of guide holes. In the above example, the bearing 2 is contacted with the end face 5D of the yoke sheet 5, but the same structure can be applied to the other bearing 3. In addition, the present invention can be applied not only to the motor with a brush but can be applied to a brushless motor or a coreless motor to produce the same effect.

(0021)

(Advantage)

As explained above, according to the present invention, since the yoke sheet is protruded from the inner circumferential surface of the insulating holder and the yoke sheet is grounded by bringing the metal bearing into contact with the yoke sheet, the displacement of the bearing is prevented and the perpendicular degree of the shaft is improved, preventing the impact of noise.

Translations
U. S. Patent and Trademark Office
8/20/02
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MOTOR

JP-U-6-9355
LAID OPEN February 4, 1994

A pair of metal bearings 2 and 3 that rotatably supports shaft 1 is held by a insulation holder 4, and a yoke plate 5 is extended into the inside of a through hole 4A. The bottom 2B of the bearing 2 is brought in contact with the end surface 5D of the yoke plate 5. The yoke plate 5 may be grounded.